

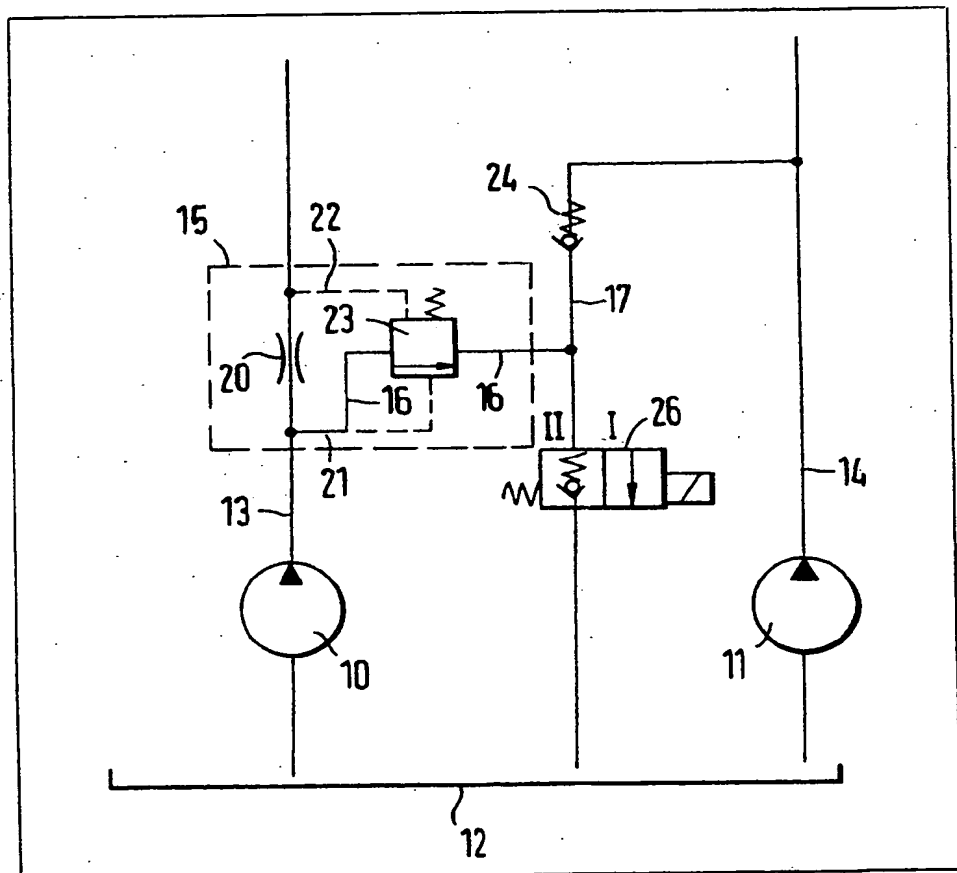
(12) UK Patent Application (19) GB (11) 2 075 132 A

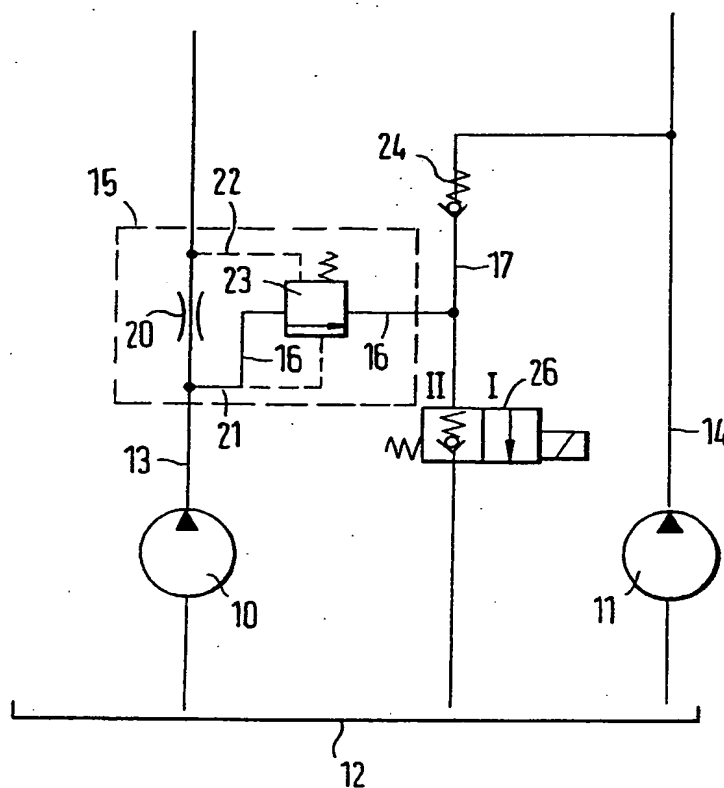
(21) Application No 8113218
(22) Date of filing
29 Apr 1981
(30) Priority data
(31) 3016943
(32) 2 May 1980
(33) Fed Rep of Germany
(DE)
(43) Application published
11 Nov 1981
(51) INT CL³ F04B 49/00
(52) Domestic classification
F1W 100 GV
(56) Documents cited
None
(58) Field of search
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F1F
F1W
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(54) An hydraulic apparatus comprising two pumps

for the second pump (11).

(57) The hydraulic apparatus has two pumps (10, 11) both of which deliver pressure medium from a reservoir (12) into delivery circuits associated with them. A three-way flow regulating valve (15) through which, if necessary, pressure medium can be delivered through the three-way valve and a connecting line (16) to the delivery circuit (14) of the second pump, is located in the delivery circuit of one of the pumps. In so doing, when a greater amount of pressure medium is required in the second delivery circuit than its pump can deliver, pressure medium can be supplied from the other working circuit through the flow regulating valve (15). That contributes to an energy saving due to a correspondingly smaller design





SPECIFICATION

An hydraulic apparatus comprising two pumps

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State of the art

The invention originates from an hydraulic apparatus according to the preamble to the main claim. With one known apparatus, the deliveries from both pumps flow into a common line in which a flow regulating valve is arranged with the aid of which the delivery is divided into two partial flows. One delivery flow serves for supplying loads, the other delivery flow serves, for example, for adjusting the adjustable pumps. With such an arrangement it is not possible to continually match the delivery flow to the needs of the loads.

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Advantages of the invention

As apposed to this, the hydraulic apparatus comprising the characterising features of the main claim has the advantage that energy can be saved by using the residual flow during peak requirements in a working circuit, that different delivery flows can be obtained in the said working circuit and that one of the pumps can be of small dimensions.

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Drawing

An embodiment of the invention is illustrated in the drawing and is described in more detail in the following specification. It shows a diagrammatic representation of an hydraulic apparatus.

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Description of the embodiment

Two pumps are referenced 10 and 11 in the drawing and which withdraw pressure medium from a reservoir 12. The pump 10 delivers pressure medium into a delivery line 13 and to a load (not shown) whereas the pump 11 delivers pressure medium into a delivery line 14 to another load (likewise not shown). A three-way flow regulating valve 15 known *per se* is connected in the delivery line 13. A connecting line 16 leads from the regulating valve to a line 17 extending parallel to the delivery line 14, that is to say the delivery lines 13, 14 are connected to one another by the lines 16, 17.

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The flow regulating valve 15 is illustrated diagrammatically. In principle it has a throttle 20 from which two ducts 21, 22 branch and lead to a control valve 23 the output from which is connected to the line 16. Moreover, the throttle 20 lies between the connections from the ducts 21, 22 to the line 13.

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A non-return valve which can open in the direction from the flow regulating valve to the line 17 which lies between the connecting point of the line 16 and the point at which the line 17 issues into the line 14. A releasable non-return valve 26 which is actuatable as

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desired, for example hydraulically or electromagnetically or in some other manner, is also arranged on the other side in the line 17. It can block the flow from the lines 16, 17 to the reservoir 12.

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When the pump 10 delivers pressure medium into the delivery line 13, a pressure difference exists at the throttle 20. If this is large enough, then the control valve 23 is so adjusted that excess pressure medium flows through the line 16 to the line 17. The regulated constant flow 20 then flows to the load connected to the line 13. Simultaneously, the pump 11 delivers pressure medium through the line 14 to the load connected thereto. If a larger quantity of pressure medium is required than the pump 11 can deliver at that instant, the non-return valve 26 is brought into its blocking position II. Then, the residual flow delivered by the pump 10 can likewise flow into the delivery line 14 through the then open non-return valve 24. If that is not required, the non-return valve 26 is located in its switching position I (through flow position) wherein the residual flow from the pump 10 flows through the line 17 to the reservoir 12.

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With the proposed arrangement, it is possible to design the pump 11 smaller than would be necessary for it to supply its load since, in cases of need, the residual flow from the pump 13 is available. This contributes substantially to the saving of energy during peak requirements in the other working circuit.

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CLAIMS

1. Hydraulic apparatus comprising two pumps of different capacities for supplying different load circuits through separate delivery lines, a connecting line leading from the delivery line from one of the pumps to the delivery line from the other pump, a three-way flow regulating valve, through which the connecting line passes, arranged in the delivery line from the pump of higher capacity, a non-return valve arranged in the connecting line and opening towards the delivery line from the pump of lower capacity, and a releasable non-return valve arranged in a branch line leading from the delivery line from the pump of lower capacity to a pressure medium reservoir and in communication with the connecting line.

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2. Apparatus according to claim 1, in which both non-return valves are arranged in the branch line.

3. Apparatus according to claim 1 or claim 2, comprising a change-over valve having a blocking position and a through flow position, the blocking position constituting the releasable non-return valve.

4. Hydraulic apparatus substantially as herein described with reference to the accompanying drawing.

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Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1981.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.